

Appl. No. 09/930,793

Amendment dated November 21, 2003

Reply to Office Action of September 23, 2003

CLAIM AMENDMENTS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS:

Claim 1 (Original) A method of calibrating a DC motor, comprising the steps of:

- a) choosing at least one PWM duty cycle value of interest;
- b) applying a startup PWM duty cycle of sufficient magnitude to insure motion of said motor;
- c) performing a first test wherein the first chosen duty cycle is applied in at least two periods, each of said periods being of opposite polarity from the period preceding it, and the current in the motor is measured during each of said periods;
- d) performing a test for each additional chosen PWM duty cycle value of interest, wherein each of said PWM duty cycles is applied in at least two periods, each of said periods being of opposite polarity from the period preceding it, and the current in the motor is measured during each of said periods; and
- e) calculating the apparent resistance of the motor.

Claim 2 (Previously Presented). The method of calibrating a DC motor of claim 1, wherein at least two PWM duty cycle values of interest are chosen.

Claim 3 (Original). The method of calibrating a DC motor of claim 1 further comprising the steps of:

- a) applying a PWM sufficient to move said motor prior to each operational movement of said motor;

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- b) taking a supplemental measurement of the current in said motor, and
- c) modifying said calculated apparent resistance.

Claim 4 (Original). The method of calibrating a DC motor of claim 1, wherein the test for each chosen PWM duty cycle values of interest comprises at least four periods.

Claim 5 (Original). The method of calibrating a DC motor of claim 1 wherein said periods are of equal time.

Claim 6 (Original). The method of calibrating a DC motor of claim 5 wherein said periods are approximately equal to two milliseconds.

Claim 7 (Original). The method of calibrating a DC motor of claim 1 further comprising the step of repeating each of said tests.

Claim 8 (Original). The method of calibrating a DC motor of claim 7 further comprising the step of applying a startup PWM duty cycle of sufficient magnitude to insure motion of said motor prior to repeating said tests.

Claim 9 (Original). The method of calibrating a DC motor of claim 1 wherein said tests are generally conducted in order from low duty cycles to high duty cycles.

Claim 10 (Original). The method of calibrating a DC motor of claim 1 wherein each of said periods is characterized by a chopping period, said chopping period being between 10 and 100 microseconds in length.

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Claim 11 (Original). The method of calibrating a DC motor of claim 1 further comprising the steps of:

- a) repeating each of said tests in the same order, recording an independent array of results; and
- b) discarding for each value of PWM all but the array exhibiting the lowest average current value, prior to calculating the apparent resistance of the motor.

Claim 12 (Original). The method of calibrating a DC motor of claim 1 further comprising the step of applying a voltage to move said motor to a known stop-point.

Claim 13 (Original). A method of calibrating a DC motor, comprising the steps of:

- a) choosing at least one direct current voltage of interest;
- b) applying a startup direct current voltage of sufficient magnitude to insure motion of said motor;
- c) performing a first test wherein the first chosen voltage is applied in at least two periods, each of said periods being of opposite polarity from the period preceding it, and the current in the motor is measured during each of said periods;
- d) performing an additional test for each chosen voltage of interest, wherein each of said voltages is applied in at least two periods, each of said periods being of opposite polarity from the period preceding it, and the current in the motor is measured during each of said periods; and
- e) calculating the apparent resistance of the motor.

Claim 14 (Original). The method of calibrating a DC motor of claim 13 wherein at least two voltages of interest are chosen.

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Claim 15 (Currently Amended). The method of calibrating a DC motor of claim 2, wherein a ~~first one of said~~ chosen PWM duty cycle value ~~values~~ is below 50 percent and a second one ~~one~~ ~~of said~~ chosen PWM duty cycle value ~~values~~ is above 50 percent.

Claim 16 (Cancelled).

Claim 17 (Cancelled).

Claim 18 (Cancelled).

Claim 19 (Cancelled).